

FY22 Performance Progress Report

Due date: July 26, 2023

[Cover Page](#)

USDA-ARS Agreement ID:	59-0206-2-125
USDA-ARS Agreement Title:	Developing Malting Barley with Reduced Fusarium Head Blight (FHB) and DON
Principle Investigator (PI):	Richard Horsley
Institution:	North Dakota State University
Institution UEI:	EZ4WPGRE1RD5
Fiscal Year:	2022
FY22 USDA-ARS Award Amount:	\$203,097
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Period of Performance:	May 1, 2022 – April 30, 2026
Reporting Period End Date:	April 30, 2023

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Award Amount
BAR-CP	Developing Two-rowed Malting Barley Cultivars with Reduced FHB and DON	\$203,097
FY22 Total ARS Award Amount		\$203,097

I am submitting this report as an: Annual Report

I certify to the best of my knowledge and belief that this report is correct and complete for performance of activities for the purposes set forth in the award documents.



7/5/2023

Principal Investigator Signature

Date Report Submitted

† BAR-CP – Barley Coordinated Project
 DUR-CP – Durum Coordinated Project
 EC-HQ – Executive Committee-Headquarters
 FST-R – Food Safety & Toxicology (Research)
 FST-S – Food Safety & Toxicology (Service)
 GDER – Gene Discovery & Engineering Resistance
 HWW-CP – Hard Winter Wheat Coordinated Project

MGMT – FHB Management
 MGMT-IM – FHB Management – Integrated Management Coordinated Project
 PBG – Pathogen Biology & Genetics
 TSCI – Transformational Science
 VDHR – Variety Development & Uniform Nurseries
 NWW – Northern Soft Winter Wheat Region
 SPR – Spring Wheat Region
 SWW – Southern Soft Red Winter Wheat Region

Project 1: Developing Two-rowed Malting Barley Cultivars with Reduced FHB and DON

1. What are the major goals and objectives of the research project?

The overall goal of this project is to develop two-rowed malting barley cultivars with enhanced resistance to FHB and reduced DON accumulation. Our goals for this project were:

1) continued development and screening of two-rowed barley lines in our breeding program for reduced FHB and DON, 2) growing the North American Barley Scab Evaluation Nursery (NABSEN) at our Osnabrock, ND research site, and 3) collect FHB and DON data on cultivars and advanced breeding lines that can be used by growers for making decisions on what cultivar(s) to grow.

2. What was accomplished under these goals or objectives? (For each major goal/objective, address these three items below.)

a) What were the major activities?

Made 45 crosses to incorporate improved agronomic performance, end-use quality, and reduced DON accumulation. F1 seed will be seeded in the 2023 summer greenhouse. Sowed 519 experimental barley lines in replicated yield trials at six locations in North Dakota.

Sowed 11,686 F₃ and F₄ head rows in Osnabrock, ND that included material that had at least one parent in its pedigree that had reduced DON accumulation.

b) What were the significant results?

The two-rowed lines 2ND39010, 2ND39092, and 2ND39256, were sown for their second year of AMBA Pilot Scale evaluation. All three lines were rated satisfactory. The lines 2ND39881, 2ND39907, 2ND40316, 2ND40324, 2ND40351, 2ND40363, and 2ND40373 were sown for their first year of AMBA Pilot Scale Evaluation. Lines found satisfactory in two years of Pilot Scale evaluation are eligible for Plant Scale evaluation. DON levels of all lines was less than that of AAC Synergy, one of the most widely grown cultivars in ND.

c) List key outcomes or other achievements.

The two-rowed line 2ND36638 was sown for its second year of Plant Scale evaluation by Rahr Malting in 2024. Cultivars found satisfactory in this final stage of evaluation are eligible for addition to the AMBA Recommended list of Malting Varieties. DON accumulation of 2ND36638 is intermediate to that of AAC Synergy and ND Genesis.

3. What opportunities for training and professional development has the project provided?

Cameron Mathews, an MS student from Indiana, is conducting research to update our genomic selection model for DON accumulation.

4. How have the results been disseminated to communities of interest?

Results are disseminated via articles in peer-reviewed journals and popular press, field day presentations, and presentations to stakeholder groups at local and regional meetings.

Publications, Conference Papers, and Presentations

Please include a listing of all your publications/presentations about your FHB work that were a result of funding from your FY22 grant award. Only citations for publications published (submitted or accepted) or presentations presented during the **award period** should be included.

Did you publish/submit or present anything during this award period May 1, 2022 – April 30, 2023?

- Yes, I've included the citation reference in listing(s) below.
 No, I have nothing to report.

Journal publications as a result of FY22 award

List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Include any peer-reviewed publication in the periodically published proceedings of a scientific society, a conference, or the like.

Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published [include DOI#]; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Books or other non-periodical, one-time publications as a result of FY22 award

Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like.

Identify for each one-time publication: Author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (book, thesis, or dissertation, other); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).

Other publications, conference papers and presentations as a result of FY22 award

Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication.